Chapter 8

Railway Equipment

Effective and adequate transportation railway support of military operations in a theater of operations requires efficient use of railway rolling stock and motive power. The trainmaster reports any misuse of rail equipment and facilities by shipping activities through the rail unit's chain of command to the commanders responsible for loading and unloading cars. Commanders must ensure that railway rolling stock is properly loaded and/or unloaded and released to the rail units.

EQUIPMENT USE

8-1. Passenger equipment is frequently limited to use in troop movements, leave trains, military casual personnel trains, and ambulance trains. Special equipment includes specially designed rolling stock for handling unusual cargo and railway work equipment and ambulance cars. If Army ambulance cars are not provided in a theater of operations, passenger equipment may be converted to ambulance cars.

8-2. When volume permits, containers and refrigerator or tank cars are handled in solid trains and given a high movement priority from origin to destination and return. The increased use of containers for the movement of military cargo provides a throughput service to the consignee. Containers so shipped must receive a high movement priority from origin to destination consignee.

8-3. When trains are exposed to enemy ground or air attack, engines and cars should be modified to provide for increased armored protection of cargo, passengers, and security elements. Armored trains may be specifically created for use by security forces in support of operations in contested areas of the railway route.

ROLLING STOCK

8-4. The worldwide inventory of Army-owned rolling stock includes locomotive cranes, tank cars, freight cars of miscellaneous types, and other equipment. It includes numerous diesel-electric locomotives stored or in use in various parts of the world. Most of the larger locomotives are designed for foreign and domestic service and are equipped with multi-gauge trucks, which can be adjusted to any gauge from 56 1/2 to 66 inches. Usually the changes in wheel gauges to suit overseas requirements are made in CONUS where wheel presses are available.

8-5. Contingency operations might require supplementary railway motive power, rolling stock, and materials. Local equipment, even if operable, would likely be inadequate to support transportation requirements of the US and allied forces under wartime conditions. The Army multi-gauge fleet, stored or used in CONUS and other parts of the world, is the basic source for supplementary items pending establishment of a procurement program. Many countries, which are potential areas of unrest, are served by narrow-gauge railroads. Equipment in these areas is often in poor condition. The locomotives and freight cars are old and in need of repair. Locomotives have low tractive effort and cars may consist largely of boxcars and a few flatcars with low-carrying capacities. These countries often have insufficient railroad facilities to serve their economic needs. Superimposing, fast moving, high-density, military tonnage would exceed local operating capabilities. The Army has developed procurement specifications for narrow-gauge rail equipment to meet the operating characteristics of the rail lines in contingency areas. Railway equipment characteristics are shown in Tables 8-1 through 8-11 (pages 8-3 through 8-9). Figure 8-1 (pages 8-10 and 8-11) is an extract from The Official Railway Equipment Register.

LOCOMOTIVE CLASSIFICATION

8-6. Locomotives are classified according to wheel arrangement. The two systems used are the Wythe and the Continental.

WYTHE SYSTEM

8-7. This system is generally accepted in Great Britain and the British Commonwealth and in North and South America. The Army uses the Wythe system to classify steam and diesel-electric locomotives. Locomotive wheels are grouped as leading, driving, and trailing wheels. Numerals separated by hyphens represent the number of wheels in each group, starting at the front end of the locomotive. The first figure represents the number of leading wheels, the second represents the number of driving wheels, and the third the number of trailing wheels. Use the figure "0" if there are no leading or trailing wheels. Tender wheels are not included. The weight distribution of a diesel-electric locomotive is different from that of a steam locomotive. This is because the diesel has no tender, leading trucks, or trailing trucks. All wheels on Army diesel-electric locomotives are driving wheels. The locomotive's weight is evenly distributed on the driving wheels.

8-8. The wheel arrangements of two locomotives using the Wythe system are shown in Figure 8-2, page 8-11. Since the wheel arrangement represents a side view of the locomotive, only one wheel of each pair is shown. The 2-8-0 steam locomotive shown has two leading wheels, eight coupled driving wheels, and no trailing wheels. The 0-6-6-0 diesel-electric locomotive shown has six driving wheels on the front truck assembly, six on the rear truck assembly, and no leading or trailing wheels. The pulling capacity of a locomotive is directly related to the number of driving wheels (drivers) and the amount of weight that rests on them.

Table 8-1. Characteristics of Locomotives

						Tractive Force (lb)			Curvature Minimum Radius (ft)	
Type	Gauge (in)	Weight (lb)	Length Over Couplers	Extreme Width	Extreme Height	Starting at 30% Adhesion	Continuous	Horse-power		Fuel Capacity (gal)
Diesel-Electric 131-T, 0-6-6-0, domestic and foreign svc	56 1/2	262,900	55'	10'0"	14'0"	75,700	37,850 at 10 MPH	1,000	231	1,600
127-T, 0-6-6-0, domestic and foreign svc	56 1/2	261,100	55'	10'0"	14'0"	75,700	37,850 at 10 MPH	1,000	231	1,600
120T, 0-6-6-0, domestic and foreign svc	56 1/2, 60 63,66	240,000 245,000 w/steam generator	57'5"	9'8"	13'6"	73,000	37,000 at 10 MPH	1,600	193	1,600 800 w/steam generator
120-T, 0-6-6-0, domestic and foreign svc	56 1/2 60, 63 66	240,000 245,000 w/steam generator	56'9"	9'7"	13'5"	72,000	36,000 at 10 MPH	1,600	193	1,600 800 w/steam generator
120-T, 0-4-4-0, domestic svc	56 1/2	240,000	55'9"	10'3"	14'6"	75,000	40,000 at 11 MPH	1,500	150	800
120-T, 0-4-4-0, domestic svc	56 1/2	246,000	48'10"	10'2"	14'6"	73,000	36,000 at 10 MPH	1,200	100	750
115-T, 0-4-4-0, domestic svc	56 1/2	230,000	45'6"	10'0"	14'6"	69,000	34,000 at 15 MPH	1,000	50	635
100-T, 0-4-4-0, domestic svc	56 1/2	199,000	44'6"	10'0"	14'4"	59,700	28,750 at 10 MPH	660	50	635
100-T, 0-4-4-0, domestic svc	56 1/2	200,000	44'5"	10'0"	14'7"	69,700	35,000 at 10 MPH	800	100	600
80-T, 0-4-4-0, domestic svc	56 1/2	161,000	36'10"	9'6"	13'7"	48,000	24,000 at 10 MPH	500	75	400
80-T, 0-4-4-0, domestic svc	56 1/2	161,000	36'10"	9'6"	13'7"	48,000	24,000 at 10 MPH	470	75	400
80-T, 0-4-4-0, domestic svc	56 1/2	161,600	41'0"	9'6"	13'4"	48,000	21,000 at 5.2 MPH	550	75	400
65-T, 0-4-4-0, domestic svc	56 1/2	130,000	34'0"	10'1"	13'5"	39,000	19,500 at 10 MPH	400	75	250

Table 8-1. Characteristics of Locomotives (continued)

						Tractive Force (lb)			Curvature Minimum Radius (ft)	
Type	Gauge (in)	Weight (lb)	Length Over Couplers	Extreme Width	Extreme Height	Starting at 30% Adhesion	Continuous	Horse-power		Fuel Capacity (gal)
60-T, 0-4-4-0, domestic and foreign svc	56 1/2 60, 63 66	122,000	38'11" (Type E) 39'3" (Willison)	9'6"	13'4"	26,000	15,680 at 7.78 MPH	500	75	500
45-T, 0-4-4-0, domestic and foreign svc	56 1/2	90,000	33'6"	9'7"	12'0"	27,000	12,000 at 6 MPH	380	75	250
45-T, 0-4-4-0, domestic svc (side rod drive)	56 1/2	90,000	28'4"	9'6"	12'0"	27,000	13,500 at 6.2 MPH	300	50	165
44-T, 0-4-4-0, domestic svc	56 1/2	91,270	33'10"	9'4"	13'3"	26,400	11,000 at 9 MPH	380	75	250
44-T, 0-4-4-0, domestic svc	56 1/2	89,000	33'5"	10'1"	13'3"	26,400	13,000 at 7.1 MPH	380	50	250
25-T, 0-4-4-0, domestic svc	56 1/2	50,000	16'1"	8'7"	10'4"	15,000	6,200 at 6.2 MPH	150	50	75
Gasoline/Diesel-Mechanical: 10-T, single-engine, 0-4-0, domestic svc	56 1/2	262,900	55'	10'0"	14'0"	75,700	37,850 at 10 MPH	1,000	231	1,600

Table 8-2. Characteristics of Locomotive Cranes

Type	Gauge (in)	Weight (lb)	Length Over Couplers	Extreme Height	Extreme Width	Boom Length (ft)	Reach Radius and Capacity	
							Main Hoist	Aux Hoist
Locomotive, steam, wrecking, 75-T, broad gauge, domestic and foreign svc	56 1/2, 60 63, 66	191,000	30'10"	17'10"	10'4"	25 (2-piece, curved)	16" (75-T) 25' (34-T)	25' (10-T) 30' (8-T)
Locomotive, crane, diesel, mech, 150-T, domestic svc	56 1/2	291,700	31'0"	15'6"	10'4"	28 (2-piece, straight)	28' (67-T)	-
Locomotive, diesel, elec, 40-T, broad gauge, domestic and foreign svc	56 1/2, 60 63, 66	221,500	36'1"	13'6"	10'4"	50 (2-piece, straight)	12' (40-T) 50' (6 3/4-T)	- -
Locomotive, diesel, elec, 40-T, domestic svc	56 1/2	220,000	29'4"	15'1"	10'6"	50 (2-piece, straight)	12' (40-T) 50' (6 3/4-T)	- -
Locomotive, diesel, mech, 25-T, broad gauge, domestic and foreign svc	56 1/2, 60 63, 66	148,000	27'7"	13'0"	8'6"	50 (2-piece, straight)	12' (25-T) 50' (4-T)	- -
Locomotive, diesel, mech, 25-T, narrow gauge, foreign svc	36, 39 3/8, 42	152,000	32'6"	12'0"	8'6"	40 (2-piece, straight)	12' (25-T) 40' (6-T)	- -
Locomotive, diesel, mech, 25-T, domestic svc	56 1/2	155,000	30'0"	15'2"	10'8"	50 (2-piece, straight)	12' (25-T) 50' (4-T)	- -
Locomotive, diesel, mech, 35-T, domestic svc	56 1/2	167,000	30'0"	15'7"	10'4"	50 (2-piece, straight)	12' (35-T) 50' (5-T)	- -

Table 8-3. Characteristics of Railway Maintenance Motor Cars

Type	Gauge (in)	Weight (lb)	Length (in)	Width (in)	Height (in)	Capacity	Horse-Power	Fuel Capacity (gal)
Gasoline, mech, 4 wheels, solid drawbar couplers, closed cab with hand brake	56 1/2	2,950	112	65	58 w/o cab	8 person	62.6	8
Gasoline, mech, 4 wheels, solid drawbar couplers, open body with hand brake	56 1/2	1,700	103	65	50	10 person	62.6	8

Table 8-4. Characteristics of Open-Top Cars

Type	Gauge (in)	Normal Capacity		Inside Dimensions			Light Weight (STONs)
		(lb)	(cu ft)	Length	Width	Height	
Gondolas:							
High side, 8W, narrow gauge, foreign svc	36, 39 3/8, 42	60,000	940	34'5"	6' 10 1/2"	4'	13.0
Low side, 8W, narrow gauge, foreign svc	36, 39 3/8, 42	60,000	356	34'6"	6' 10 1/2"	1'6"	12.1
High side, 8W, broad gauge, foreign svc	56 1/2	80,000	1,680	40'	8' 3 3/4"	4'	18.0
Low side, 8W, broad gauge, foreign svc	56 1/2, 60, 63, 66	80,000	500	40' 4 1/2"	8' 3 1/3"	1'6"	16.0
Low side, 8W, drop ends, domestic svc	56 1/2	100,000	1.184	41'6"	9' 6 1/8"	3'	23.0
High side, std gauge, domestic svc	56 1/2	100,000	1.580	41'6"	9'6"	4'6"	25.0
Hopper Cars:							
8W, domestic svc	56 1/2	100,000	-	33'	9' 5 1/2"	9'7"	-

Table 8-5. Characteristics of Flatcars

Type	Gauge (in)	Normal Capacity (lb)	Platform Length	Platform Width	Platform Height Above Rail	Light Weight (STONs)
8W, narrow gauge, foreign svc	36, 39 3/8, 42	60,000	34' 8 1/2"	7'2"	3'7"	10.9
12W, domestic svc	56 1/2	200,000	54'	10' 6 1/2"	4' 1 1/4"	35.0
8W, domestic svc	56 1/2	200,000	54'	10' 6 1/2"	4' 1 1/4"	35.0
12W, broad gauge, foreign svc, 80-T	56 1/2, 60, 63, 66	160,000	46'4"	9'8"	4' 2 7/8"	35.3
12W, domestic svc (passenger train svc)	56 1/2	200,000	54'	10' 6 1/4"	4' 5 3/8"	-
8W, domestic svc	56 1/2	100,000	43'3"	10'6"	3'8"	25.5
8W, broad gauge, foreign svc	56 1/2, 60, 63, 66	80,000	40'9"	8' 7 1/4"	3' 6 15/16"	14.5
8W, broad gauge, depressed center, foreign svc	56 1/2, 60, 63, 66	140,000	50'7"	9'8"	NA	41.5

Table 8-6. Characteristics of Boxcars

Type	Gauge (in)	Capacity		Inside Dimensions			Door Dimensions	Light Weight (STONs)
		(lb)	(cu ft)	Length	Width	Height		
8W, domestic svc	56 1/2	100,000	3.975	50'6"	9'3"	10'6"	10' wide, clear opening 8' high, clear opening	23.0
8W, broad gauge, foreign svc	56 1/2, 60, 63, 66	80,000	2,520	40'6"	8'6"	6' 5 5/8"	6' 8 3/4" wide, 8' 3 1/4" high	18.5

Table 8-7. Characteristics of Tank Cars

Type	Gauge (in)	Length Over Tank Heads	Normal Capacity (gal)*	Inside Diameter (in)		Light Weight (STONs)
				Tank	Dome	
Nickel-clad, ICC-103-AW, 8W, domestic svc	56 1/2	31'11"	7,500	78 (approx)	45	-
ICC-103, ICC-103-W, 8W, domestic svc	56 1/2	34' (approx.)	10,000	87 (approx)	59 3/8 (approx)	-
Caustic soda, ICC-103-W, 8W, domestic svc	56 1/2	34' (approx)	10,000	88 (approx)	64	-
Petroleum, 8W, narrow gauge, foreign svc	36, 38 3/8, 42	38' 4 7/8"	6,000	62 1/2	54	16
Petroleum, 8W, broad gauge, foreign svc	56 1/2, 60, 63, 66	38' 5 3/8"	10,000	80 3/4	66 1/2	19
Nitric acid, ICC-103-W, 8W, domestic svc	56 1/2	33' 7 1/2"	7,800	78 (approx)	33 3/8	-
Phosphorus, ICC-103-W, 8W, domestic svc	56 1/	34' 8 1/4"	8,000	78 (approx)	64	-
Petroleum, std gauge, domestic svc	56 1/2	-	10,000	-	-	23
*Specific gravity of a liquid should be checked before it is loaded to avoid exceeding weight capacity of car.						

Table 8-8. Characteristics of Refrigerator Cars

Type	Gauge (in)	Normal Capacity (lb)	Length Inside End Lining	Width Inside Side Lining	Ice Capacity (lb)	Door Dimensions
8W, disassembled, foreign svc	56 1/2	80,000	38' 9 1/2"	6'11"	11,000	4' wide 7' high
8W, disassembled, broad gauge, foreign svc	56 1/2, 60, 63, 66	80,000	32' 1/2"	7'8" (approx)	11,000	4' wide 7' high
8W, mechanical, foreign svc	56 1/2, 60, 63, 66	80,000	40'9" equipment compartment	7'6" (approx)	None	6' wide 7' high

Table 8-9. Characteristics of Special-Purpose Cars

Type	Gauge (in)	Weight (lb)		Over End Sills		Height Above Rail	Remarks
		Light	Loaded	Length	Width		
Car, amb unit, 8W, domestic svc	56 1/2	157,000	167,300	78'11"	10'	13'6"	Capacity: 27 patients, 6 corpsmen, 1 nurse, 1 doctor
Car, guard, domestic svc	56 1/2	92,740	99,300	57'	9'1"	14' 2 1/2"	Air-conditioned, shower, toilet kitchen, 2 sleeping compartments
Car, kitchen, troop/amb train, 8W, domestic svc	56 1/2	100,160	NA	54' 2 1/2"	9' 5 3/4"	13'6"	Width, side door opening: 6'
Car, kitchen, dining and storage, amb train, 8W, foreign svc	56 1/2, 60, 63, 66	111,400 (avg)	NA	63' 1/4"	9'	13'	Seat capacity: 24
Car, personnel, amb train	56 1/2, 60, 63, 66	111,400 (avg)	NA	63' 1/4"	9'	13'	Berth capacity: 15 EM, 4 doctors, 2 nurses

Table 8-10. Characteristics of German Freight Cars

Type	Number of Axles	Light Weight (STONs)	Capacity							Height of Floor Above Top of Rail
			Weight (STONs)	Cube (cu ft)	Inside Dimensions			Door Dimensions		
					Length	Width	Height	Width	Height	
Boxcar:										
G	2	11.4	16.5	1,500	25' 11 3/4"	8'	7' 4 9/16"	4' 11 1/16"	6' 6 11/16"	4' 1/16"
GLMHS-50	2	13.4	23.1	2,500	36' 9 5/16"	8' 11 1/16"	9' 5/8"	6' 6 1/16"	6' 6 11/16"	4' 9/16"
GM-30	2	12.7	23.1	1,700	24' 10"	8' 10"	31' 4"	5' 6"	6'	Not avail
GMS-54	2	12.6	23.1	2,100	30' 5 11/16"	8' 8 11/16"	8' 9 1/2"	5' 10 13/16"	6' 7 1/8"	4' 1/16"
KMMKS-51	2	12/5	30.8	1,420	28' 8 13/16"	9' 5/8"	5' 6 1/8"	5' 10 13/16"	4' 10 5/8"	4' 1 7/116"
KMM8KS-58	2	14.3	29.7	1,800	28' 8 9/16"	8' 11 1/16"	7' 15/16"	12' 8 3/4"	6' 6 11/16"	4' 11/16"
Gondola:										
X-05 (low side)	2	Not avail	23.1	320	25' 7"	8' 7"	1' 4"	NA	NA	Not avail
XLM-57 (low side)	2	8.4	23.1	330	29' 7"	8' 6"	1' 4"	NA	NA	4'
OMM-37 (high side)	2	9.7	24.6	1,210	27' 7"	9'	4' 10"	NA	NA	4'
OMM-52 (high side)	2	11.0	28.6	1,200	28'	8'	4' 10"	NA	NA	4'
OMM-55 (high side)	2	11.0	27.5	1,200	28' 8 9/16"	9' 3/8"	4' 11 1/16"	5' 10 1/2"	NA	4' 7/8"
OMM-53 (high side)	2	12.1	27.5	1,200	28'	8'9"	4'10"	NA	NA	4'
OMM-33 (high side)	2	11.5	27.0	1,260	28' 7 3/16"	9' 7/16"	5'1"	4' 11 1/16"	NA	4' 5/8"
OMM-33 (high side)	2	11.5	27.0	1,260	28' 7 3/16"	9' 7/16"	5'1"	4' 1 1/16"	NA	4' 5/8"
Flatcar:										
R-10[1]	2	10.6	16.5	NA	33' 25/16"	8'9"	NA	NA	NA	4'
RM-31[1]	2	14.3	22.1	NA	34' 11 9/16"	8' 6 5/16"	NA	NA	NA	4' 11/8"

Table 8-10. Characteristics of German Freight Cars (continued)

Type	Number of Axles	Light Weight (STONs)	Capacity							Height of Floor Above Top of Rail
			Weight (STONs)	Cube (cu ft)	Inside Dimensions			Door Dimensions		
					Length	Width	Height	Width	Height	
RMM-33[1]	2	11.4	27.0	NA	34' 8 3/8"	9' 2 1/4"	NA	NA	NA	4' 1 1/4"
RLMMS-56[1]	2	14.0	25.3	NA	40'	8'11"	NA	NA	NA	4'
SM-14[1]	2	11.9	23.1	NA	41' 6"	8'9"	NA	NA	NA	Not avail
SS-15[1]	4	21.5	40.2	NA	48' 2"	8'9"	NA	NA	NA	Not avail
SSLMA-44	4	22.7	44.1	NA	59' 2 7/16"	9' 1/4"	NA	NA	NA	4' 5 3/4"
SSLMAS-53	4	26.3	61.6	NA	60' 8 5/16"	8' 11 13/16"	NA	NA	NA	4' 6 1/8"
SSKM-49	4	17.1	55.1	NA	40' 8 3/4"	8' 5 15/16"	NA	NA	NA	4' 3 9/16"
Flatcar (USA-owned)										
Tank car	2	14.0	NA	(2)	21' 2"	NA	Not avail	NA	NA	5'
Tank car	4	26.4	NA	(3)	33' 1/2"	NA	Not avail	NA	NA	5'
		(MTs)	(MTs)	(cu m)	(m)	(m)	(m)	(m)	(m)	(m)
RS 683,684,685	4	24.0	56.0	51.3	18.5	2.77	NA	NA	NA	1.33
RS689	4	23.6	56.0	51.0	18.5	2.77	NA	NA	NA	1.33
REMMS665	4	21.4	58.5	35.1	12.6	2.78	NA	NA	NA	1.33
RES686	4	25.0	55.0	49.0	18.5	2.75	NA	NA	NA	1.23
SA705	6	22.3	67.5	35.3	11.2	2.73	NA	NA	NA	1.43
SA (h) S710	6	31.0	65.0	45.7	15.0	2.56	NA	NA	NA	1.37
Sahs 711	6	31.5	64.0	Turning side jacks flooding molds	NA	2.90	NA	NA	NA	NA
		(MTs)	(MTs)	(cu m)	(m)	(m)	(m)	(m)	(m)	(m)
SGjs 716 (w) 718	4	24.0	18.8	55.0	2.7	NA	NA	NA	NA	1.24
shis	4	22.7	NA	NA	NA	NA	NA	NA	NA	NA
SAS709	6	30.6	65.0	46.0	15.0	3.09	1.37	NA	NA	NA
TS851	2	11.7	28.0	24.0	8.76	2.76	1.68	NA	NA	1.25
TCS850	2	11.6	28.0	24.0	8.66	2.76	1.68	NA	NA	1.25
TIS858	2	13.0	26.5	23.8	8.75	2.72	2.16	NA	NA	1.23
Tbis871	2	15.1	24.5	34.0	12.7	2.67	2.26	NA	NA	1.17
Tbis 869,870,875	2	14.4	25.5	34.0	12.7	2.67	2.26	NA	NA	1.17

[1] Height of flatcar is determined by height of stanchion.

[2] 4,356 US gallons.

[3] 14,266 US gallons.

Table 8-11. Characteristics of Korean Freight Cars

Type	Number of Axles	Light Weight (STONs)	Capacity		Inside Dimensions (m)			Door		Height (m) of Floor Above Top of Rail
			Weight (lb)	Cube (cu m)				Dimensions (m)		
					Length	Width	Height	Width	Height	
Boxcar:										
40-T	4	21	88,160	87	12.95	2.7	2.5	1.7	2.1	1.1
50-T	4	22	110,200	95	13.04	2.8	2.6	1.8	2.1	1.6
Gondola:										
40-T	4	19	88,160	40	11.00	2.6	1.4	NA	NA	1.1
50-T	4	20	110,200	49	13.04	2.7	1.4	NA	NA	1.6
Flatcar:										
40-T	4	16	88,160	NA	12.20	2.5	NA	NA	NA	1.1
50-T	6	20	110,200	NA	15.00	2.9	NA	NA	NA	1.2
Tank car (USA-owned)	4	22	88,160	(10,000 gal)	11.09	2.9	2.7	NA	NA	1.1

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DEPARTMENT OF DEFENSE,
MILITARY TRAFFIC MANAGEMENT COMMAND-WASHINGTON, D.C. 20315.

7-83

Reporting Marks and ACI Nos. — DODX - 1 158

GENERAL OFFICES: Headquarters, Military Traffic Management Command, Eastern Area, Attn: MTE-INR-M, Military Ocean Terminal, Bayonne, NJ 07002 (201)823-6411-6412-6413

FREIGHT EQUIPMENT

Cars are marked "DODX" and are numbered and classified as follows:

Line No.	A.A.R. Mech. Desig.	DESCRIPTION *See Explanation Pages for Abbreviations & Symbols*	A.A.R. Car Type Code	NUMBERS ▸ *Change from Previous Issue*	DIMENSIONS												CAPACITY		No. of Cars
					INSIDE			OUTSIDE						DOORS			Cubic Feet Level Full	Lbs. (000)	
					Length	Width	Height	Length	Width		Height from Rail			Side					
									At Eaves or Top of Sides or Platform	Extreme Width	To Extreme Width	To Eaves or Top of Sides or Platform	To Extreme Height	Width of Open'g	Height of Open'g			
					ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.			
		DODX																	
1	XP	Box, End Doors: Width 8'2" & Height 10'2". Removable Shipping Containers, (Heat Exchangers)	A101	▸ 27480 - 27491	40 6	9 2	10 6	44 4	9 4	10 6	13 10	14 5	15 . . .	8 . . .	9 10	3903	100	12
2	XP	Box, End Doors: Width 9'6" & Height 8'6". Removable Shipping Containers, (Heat Exchangers)	A606	▸ 29010 - 29024	59 9	9 5	9 9	65 6	9 11	10 8	12 1	14 . . .	14 9	27 . . .	8 6	5487	164	15
3	XP	Box, End Doors: Width 9'6" & Height 8'6". Removable Shipping Containers, (Heat Exchangers), 15" Freightmaster End of Car Cushioning	A606	▸ 29300 - 29314	59 9	9 5	9 9	67 10	9 11	10 8	12 1	14 . . .	14 9	27 . . .	8 6	5487	161	15
4	FMS	Flat, Stl., Load Limit at Center of Car, (Navy Gun Mounts)	F211	▸ 32002	40 . . .	10 6	. . . . .	46 2	. . . . .	10 6	5 8	3 11	5 8	. . . . .	. . . . .	. . . . .	140	1
5	FMS	Flat, Stl., Load Limit at Center of Car, (Navy Gun Mounts)	F211	▸ 32003 - 32007	40 . . .	9 1	. . . . .	43 2	. . . . .	10 2	3 8	3 8	5 . .	. . . . .	. . . . .	. . . . .	140	5
6	FM	Flat, Heavy Duty	F502	▸ 38016 - 38664	40 . . .	10 6	. . . . .	57 4	. . . . .	10 7	4 2	4 2	4 2	. . . . .	. . . . .	. . . . .	200	543
7	FM	Flat, (Diesel Locomotives)	F502	▸ 38063, 38429, 38434, 38488, 38617	54 . . .	10 6	. . . . .	56 6	. . . . .	10 7	4 2	4 2	4 2	. . . . .	. . . . .	. . . . .	200	5
8	FM	Flat, (Navy Gun Mounts)	F502	▸ 38148, 38178, 38190, 38221, 38223, 38272, 38313, 38424, 38445, 38458, 38463, 38522, 38524, 38540, 38562, 38638, 38661	54 . . .	10 5	. . . . .	57 4	. . . . .	10 7	4 2	4 2	4 2	. . . . .	. . . . .	. . . . .	200	17
9	LF	Flat, Heavy Duty, Demountable Container	L007	▸ 38170, 38187, 38200, 38280, 38311, 38566	54 . . .	10 6	. . . . .	57 4		10 7	4 2	4 2	4 2				200	6
10	FW	Flat, Well, Four 4-Wheel Trucks, (Stearn Generators), Axle Spac. 5'10", Truck Ctrs, 34'6"	F361	▸ 38851 - 38854	46 8													2
11	FW	Flat	F361	▸ 38852, 38854	46 8													2
12	FW	Flat, Well, Four 4-Wheel Trucks, Axle Spac. 5'. Truck Ctrs. 34'6" F + Note 1	F362	▸ 38864	53 6													1
13	FW	Flat, Well, Four 4-Wheel Trucks, (Stearn Generators), Axle Spac. 5'. Truck Ctrs. 40'4"	F461	▸ 38865 - 38867	46 4													3
14	FM	Flat	F502	▸ 39095 - 39199	54 . . .													0
15	FM	Flat	F301	▸ 39500 - 39649	50 . . .	10 3	. . . . .	53 3	. . . . .	10 3	3 8	3 8	3 8	. . . . .	. . . . .	. . . . .	160	73
16	FMS	Flat, Chain Tie-Downs	F311	▸ 39503, 39531 - 39533, 39544, 39552, 39560, 39563 - 39566, 39571 - 39573, 39575 - 39577, 39584, 39586, 39590 - 39592, 39595, 39597, 39602 - 39604, 39606, 39608, 39610 - 39611, 39617 - 39620, 39624 - 39625, 39627, 39629 - 39630, 39632, 39634 - 39635, 39645, 39647 - 39649	50 . . .	10 3	. . . . .	53 3	. . . . .	10 8	3 2	3 9	3 9	. . . . .	. . . . .	. . . . .	160	47
17	FM	Flat, (Navy Gun Mounts)	F301	▸ 39519, 39558, 39569, 39582, 39623, 39626, 39639	50 . . .	10 3	. . . . .	53 3	. . . . .	10 3	3 8	3 8	3 9	. . . . .	. . . . .	. . . . .	160	7
18	LF	Flat . . . . . Note 2	L007	▸ 39524, 39599, 39637	50 . . .	10 3	. . . . .	53 3	. . . . .	10 3	3 8	3 8	3 8	. . . . .	. . . . .	. . . . .	160	3
19	LF	Flat . . . . . Note 3	L007	▸ 39535, 39546, 39551, 39559, 39579, 39587 - 39588, 39596, 39609, 39612, 39616, 39640	50 . . .	10 3	. . . . .	53 3	. . . . .	10 3	3 8	3 8	3 9	. . . . .	. . . . .	. . . . .	160	12
20	FD	Flat . . . . . Note 4	F433	▸ 39600 - 39609	72 6	10 2	2 6	79 6	. . . . .	10 2	4 11	4 11	8 4	. . . . .	. . . . .	. . . . .	300	10
21	FD	Flat . . . . . C Note 5	F432	▸ 39610 - 39632	58 . . .	9 . . .	2 1	62 10	6 . . .	10 . . .	4 1	4 3	15 4	. . . . .	. . . . .	. . . . .	300	9
22	FD	Flat . . . . . C Note 6	F432	▸ 39812, 39813, 39820 - 39821, 39824 - 39825	58 . . .	9 . . .	2 1	62 10	9 . . .	10 . . .	4 1	4 3	13 10	. . . . .	. . . . .	. . . . .	300	6
23	FD	Flat C	F432	▸ 39819	58 . . .	9 . . .	2 1	62 10	9 . . .	10 . . .	4 1	4 3	15 4	. . . . .	. . . . .	. . . . .	300	1
24	FD	Flat	F432	▸ 39862, 39827 - 39829, 39831 - 39832	58 . . .	9 . . .	2 1	62 10	6 . . .	10 . . .	4 1	4 3	13 10	. . . . .	. . . . .	. . . . .	300	6
25	FD	Flat	F432	▸ 39830	58 . . .	9 . . .	2 1	62 10	. . . . .	10 . .	4 1	4 3	13 10	. . . . .	. . . . .	. . . . .	300	1
26	FD	Flat, Well, Depressed Center C	F433	▸ 39633 - 39647	71 8	9 2	2 . . .	77 1	6 . . .	9 2	4 11	4 11	15 4	. . . . .	. . . . .	. . . . .	315	4
27	FD	Flat, Well, Depressed Center . . . . . C Note 7	F433	▸ 39833, 39838	71 8	9 2	2 . . .	77 . . .	6 . . .	9 2	4 11	4 11	15 4	. . . . .	. . . . .	. . . . .	315	2
28	FD	Flat, Well, Depressed Center . . . . . Note 8	F433	▸ 39839, 39843, 39847	71 8	9 2	2 . . .	77 1	. . . . .	9 2	4 11	4 11	8 4	. . . . .	. . . . .	. . . . .	315	3
29	FD	Flat C	F433	▸ 39840	71 8	9 2	2 . . .	77 . . .	. . . . .	9 2	4 11	4 11	15 4	. . . . .	. . . . .	. . . . .	315	1
30	FD	Flat C	F433	▸ 39841	71 8	9 2	2 . . .	77 1	. . . . .	9 2	4 11	4 11	15 4	. . . . .	. . . . .	. . . . .	315	1
31	FD	Flat	F433	▸ 39842	71 8	9 2	2 . . .	77 . . .	. . . . .	9 2	4 11	4 11	15 1	. . . . .	. . . . .	. . . . .	315	1
32	FD	Flat	F433	▸ 39844	71 8	9 2	2 . . .	77 1	. . . . .	9 2	4 11	4 11	7 2	. . . . .	. . . . .	. . . . .	315	1
33	FD	Flat	F433	▸ 39845, 39846	71 8	9 2	2 . . .	77 1	. . . . .	9 2	4 11	4 11	15 1	. . . . .	. . . . .	. . . . .	315	2
34	FMS	Flat . . . . . Note 9	F411	▸ 39900	44 . . .	9 2	13 8	47 7	6 . . .	9 10	4 2	4 2	13 8	. . . . .	. . . . .	. . . . .	375	1
35	FMS	Flat . . . . . Note 10	F411	▸ 39901 - 39907	44 . . .	9 2	. . . . .	47 7	. . . . .	9 10	4 2	4 2	4 2	. . . . .	. . . . .	. . . . .	375	7
36	FMS	Flat . . . . . Note 11	F421	▸ 39911	40 . . .	10 8	. . . . .	70 8	. . . . .	10 8	4 3	4 3	7 5	. . . . .	. . . . .	. . . . .	621	1
37	FMS	Flat . . . . . Note 12	F421	▸ 39912 - 39913	50 . . .	10 8	. . . . .	70 8	. . . . .	10 8	4 3	4 3	7 5	. . . . .	. . . . .	. . . . .	616	2
38	FMS	Flat, Axle Spac. 4'6". Truck Ctrs. 33'	F421	▸ 39914 - 39917	50 . . .	10 8	. . . . .	70 6	. . . . .	10 8	4 3	4 3	4 3	. . . . .	. . . . .	. . . . .	600	4
39	FMS	Flat, Stl., Axle Spac. 5'6". Truck Ctrs. 46'3"	F423	▸ 40000 - 40100	68 . . .	10 3	. . . . .	72 10	. . . . .	10 6	3 9	4 . . .	4 1	. . . . .	. . . . .	. . . . .	299	101
40	FMS	Flat	F423	▸ 40101 - 40244	68 . . .	10 5	. . . . .	72 10	. . . . .	10 5	4 1	4 1	4 1	. . . . .	. . . . .	. . . . .	299	144
		Total																	1177

NOTE

Example only - not to be substituted for the register.

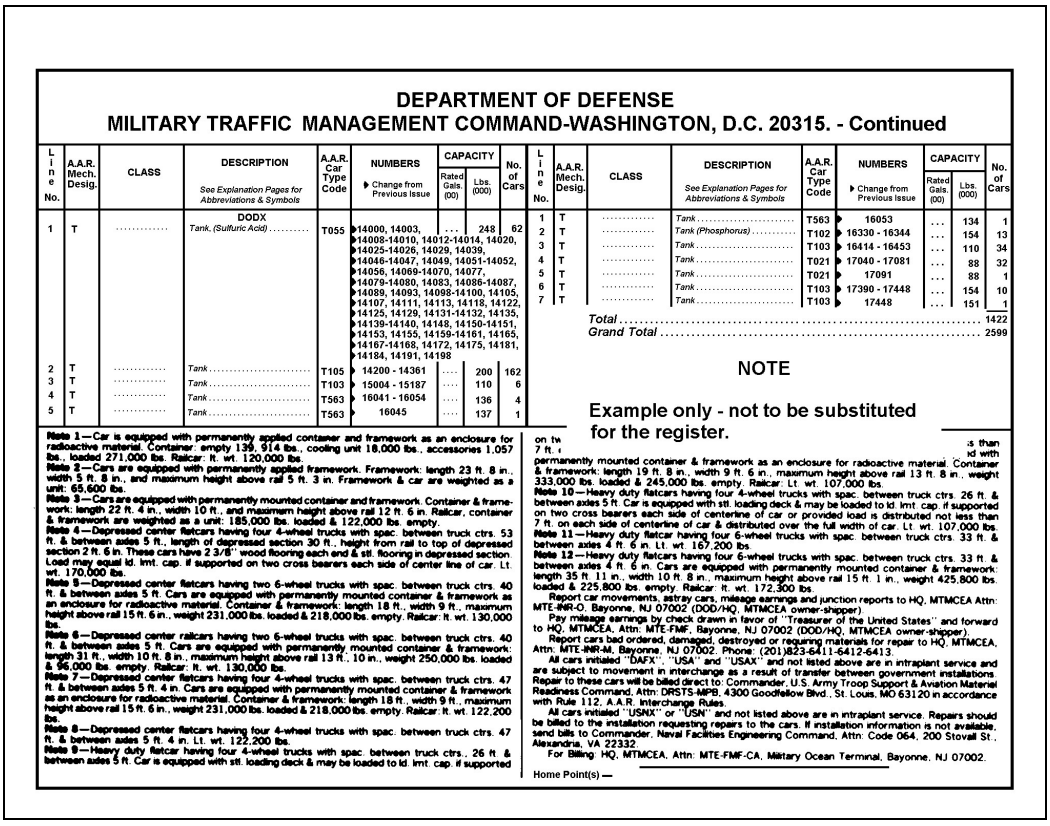
TANK EQUIPMENT

Cars are marked "DODX" and are numbered and classified as follows:

Line No.	A.A.R. Mech. Desig.	CLASS	DESCRIPTION *See Explanation Pages for Abbreviations & Symbols*	A.A.R. Car Type Code	NUMBERS ▸ *Change from Previous Issue*	CAPACITY		No. of Cars
						Rated Gals. (00)	Lbs. (000)	
			DODX					
1	T		Tank	T103	▸ 6000 - 6199		110	127
2	T		Tank	T543	▸ 8649 - 8744		110	1
3	T		Tank	T563	▸ 8813 - 8824		134	12
4	T		Tank	T103	▸ 9200 - 9401		110	177
5	T		Tank, Insulated, Steam Coils	T103	▸ 9435 - 9498		154	50

Line No.	A.A.R. Mech. Desig.	CLASS	DESCRIPTION *See Explanation Pages for Abbreviations & Symbols*	A.A.R. Car Type Code	NUMBERS ▸ *Change from Previous Issue*	CAPACITY		No. of Cars
						Rated Gals. (00)	Lbs. (000)	
1	T		Tank	T103	▸ 9508 - 9517	. . .	110	3
2	T		Tank, Steam Coils	T103	▸ 11635 - 11680	. . .	110	19
3	T		Tank	T103	▸ 11680 - 12373	. . .	110	523
4	T		Tank, Steam Coils	T103	▸ 12600 - 12800	. . .	110	63
5	T		Tank	T105	▸ 14000 - 14190	. . .	248	120

Figure 8-1. Characteristics of DOD Military Rail Fleet Cars (Extract From The Official Railway Equipment Register)



DEPARTMENT OF DEFENSE
MILITARY TRAFFIC MANAGEMENT COMMAND-WASHINGTON, D.C. 20315. - Continued

Line No.	A.A.R. Mech. Desig.	CLASS	DESCRIPTION (See Explanation Pages for Abbreviations & Symbols)	A.A.R. Car Type Code	NUMBERS (Change from Previous Issue)	CAPACITY Rated Gals. (00)	CAPACITY Lbs. (000)	No. of Cars
1	T	.....	DODX Tank, (Sulfuric Acid)	T055	14000, 14003, 14008-14010, 14012-14014, 14020, 14025-14026, 14029, 14039, 14046-14047, 14049, 14051-14052, 14056, 14069-14070, 14077, 14079-14080, 14083, 14086-14087, 14089, 14093, 14098-14100, 14105, 14107, 14111, 14113, 14118, 14122, 14125, 14129, 14131-14132, 14135, 14139-14140, 14148, 14150-14151, 14153, 14155, 14159-14161, 14165, 14167-14168, 14172, 14175, 14181, 14184, 14191, 14198	...	248	62
2	T	.....	Tank	T105	14200 - 14361	....	200	162
3	T	.....	Tank	T103	15004 - 15187	....	110	6
4	T	.....	Tank	T563	16041 - 16054	....	136	4
5	T	.....	Tank	T563	16045	....	137	1
1	T	.....	Tank	T563	16053	...	134	1
2	T	.....	Tank (Phosphorus)	T102	16330 - 16344	...	154	13
3	T	.....	Tank	T103	16414 - 16453	...	110	34
4	T	.....	Tank	T021	17040 - 17081	...	88	32
5	T	.....	Tank	T021	17091	...	88	1
6	T	.....	Tank	T103	17390 - 17448	...	154	10
7	T	.....	Tank	T103	17448	...	151	1
			Total					1422
			Grand Total					2599

NOTE

Example only - not to be substituted for the register.

Note 1—Car is equipped with permanently applied container and framework as an enclosure for radioactive material. Container: empty 139, 914 lbs., cooling unit 18,000 lbs., accessories 1,057 lbs., loaded 271,000 lbs. Railcar: ft. wt. 120,000 lbs.
Note 2—Cars are equipped with permanently applied framework. Framework: length 23 ft. 8 in., width 5 ft. 8 in., and maximum height above rail 5 ft. 3 in. Framework & car are weighted as a unit: 65,600 lbs.
Note 3—Cars are equipped with permanently mounted container and framework. Container & framework: length 22 ft. 4 in., width 10 ft., and maximum height above rail 12 ft. 6 in. Railcar, container & framework are weighted as a unit: 185,000 lbs. loaded & 122,000 lbs. empty.
Note 4—Depressed center flatcars having four 4-wheel trucks with spac. between truck ctrs. 53 ft. & between axles 5 ft., length of depressed section 30 ft., height from rail to top of depressed section 2 ft. 6 in. These cars have 2 3/8" wood flooring each end & stl. flooring in depressed section. Load may equal ld. lmt. cap. if supported on two cross bearers each side of center line of car. Lt. wt. 170,000 lbs.
Note 5—Depressed center flatcars having two 6-wheel trucks with spac. between truck ctrs. 40 ft. & between axles 5 ft. Cars are equipped with permanently mounted container & framework as an enclosure for radioactive material. Container & framework: length 18 ft., width 9 ft., maximum height above rail 15 ft. 6 in., weight 231,000 lbs. loaded & 218,000 lbs. empty. Railcar: lt. wt. 130,000 lbs.
Note 6—Depressed center railcars having two 6-wheel trucks with spac. between truck ctrs. 40 ft. & between axles 5 ft. Cars are equipped with permanently mounted container & framework: length 31 ft., width 10 ft. 8 in., maximum height above rail 13 ft., 10 in., weight 250,000 lbs. loaded & 96,000 lbs. empty. Railcar: lt. wt. 130,000 lbs.
Note 7—Depressed center flatcars having four 4-wheel trucks with spac. between truck ctrs. 47 ft. & between axles 5 ft. 4 in. Cars are equipped with permanently mounted container & framework as an enclosure for radioactive material. Container & framework: length 18 ft., width 9 ft., maximum height above rail 15 ft. 6 in., weight 231,000 lbs. loaded & 218,000 lbs. empty. Railcar: lt. wt. 122,200 lbs.
Note 8—Depressed center flatcars having four 4-wheel trucks with spac. between truck ctrs. 47 ft. & between axles 5 ft. 4 in. Lt. wt. 122,200 lbs.
Note 9—Heavy duty flatcar having four 4-wheel trucks with spac. between truck ctrs., 26 ft. & between axles 5 ft. Car is equipped with stl. loading deck & may be loaded to ld. lmt. cap. if supported on tw... 7 ft. ... permanently mounted container & framework as an enclosure for radioactive material. Container & framework: length 19 ft. 8 in., width 9 ft. 6 in., maximum height above rail 13 ft. 8 in., weight 333,000 lbs. loaded & 245,000 lbs. empty. Railcar: Lt. wt. 107,000 lbs.
Note 10—Heavy duty flatcars having four 4-wheel trucks with spac. between truck ctrs. 26 ft. & between axles 5 ft. Car is equipped with stl. loading deck & may be loaded to ld. lmt. cap. if supported on two cross bearers each side of centerline of car or provided load is distributed not less than 7 ft. on each side of centerline of car & distributed over the full width of car. Lt. wt. 107,000 lbs.
Note 11—Heavy duty flatcar having four 6-wheel trucks with spac. between truck ctrs. 33 ft. & between axles 4 ft. 6 in. Lt. wt. 167,200 lbs.
Note 12—Heavy duty flatcars having four 6-wheel trucks with spac. between truck ctrs. 33 ft. & between axles 4 ft. 6 in. Cars are equipped with permanently mounted container & framework: length 35 ft. 11 in., width 10 ft. 8 in., maximum height above rail 15 ft. 1 in., weight 425,800 lbs. loaded & 225,800 lbs. empty. Railcar: ft. wt. 172,300 lbs.
Report car movements, astray cars, mileage earnings and junction reports to HQ, MTMCEA Attn: MTE-INR-O, Bayonne, NJ 07002 (DOD/HQ, MTMCEA owner-shipper).
Pay mileage earnings by check drawn in favor of "Treasurer of the United States" and forward to HQ, MTMCEA, Attn: MTE-FMF, Bayonne, NJ 07002 (DOD/HQ, MTMCEA owner-shipper).
Report cars bad ordered, damaged, destroyed or requiring materials for repair to HQ, MTMCEA, Attn: MTE-INR-M, Bayonne, NJ 07002. Phone: (201)823-6411-6412-6413.
All cars initialed "DAFX", "USA" and "USAX" and not listed above are in intraplant service and are subject to movement in interchange as a result of transfer between government installations. Repair to these cars will be billed direct to: Commander, U.S. Army Troop Support & Aviation Materiel Readiness Command, Attn: DRSTS-MPB, 4300 Goodfellow Blvd., St. Louis, MO 63120 in accordance with Rule 112, A.A.R. Interchange Rules.
All cars initialed "USNX" or "USN" and not listed above are in intraplant service. Repairs should be billed to the installation requesting repairs to the cars. If installation information is not available, send bills to Commander, Naval Facilities Engineering Command, Attn: Code 064, 200 Stovall St., Alexandria, VA 22332.
For Billing: HQ, MTMCEA, Attn: MTE-FMF-CA, Military Ocean Terminal, Bayonne, NJ 07002.
Home Point(s) —

Figure 8-1. Characteristics of DOD Military Rail Fleet Cars (Extract From The Official Railway Equipment Register) (continued)

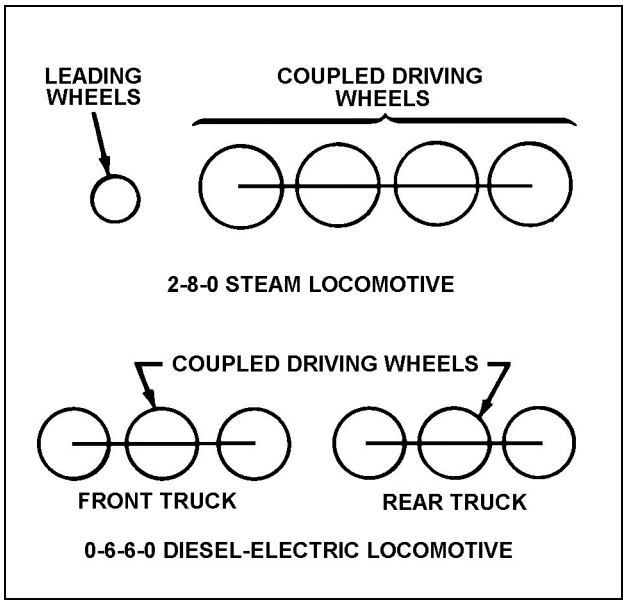


Figure 8-2. Wythe System of Wheel Arrangement (Two Locomotives)

8-9. The amount of a locomotive's weight that rests on its drivers is expressed in pounds or short tons of 2,000 pounds each. All tons mentioned in this text are short tons. Therefore, the terms "ton" and "short ton" are used interchangeably. The distribution of weight on drivers differs between steam and diesel-electric locomotives. This is important when computing tractive effort. The weight distribution of a 2-8-0 steam locomotive and tender is shown in Figure 8-3. The locomotive and tender weigh 296,350 pounds, but only that portion of the total weight that rests on the driving wheels (141,500 pounds) affects the work capacity or pulling power of the locomotive. On a diesel-locomotive, the weight of the locomotive is evenly distributed over all the wheels since all wheels are driving wheels.

CONTINENTAL SYSTEM

8-10. This system, commonly used in Europe and other parts of the world, uses letters and figures to identify a diesel or electric locomotive by its axles. Letters are used for driving axles and numbers are used for nondriving axles. In this system, "A" stands for one driving axle, "B" for two, "C" for three, and" D" for four. A small "o" placed after the initial letters shows that each axle is individually powered. Therefore, a single unit locomotive with two individually powered two-axle trucks would be classified as Bo-Bo. One with three axle trucks in which the center axle is an idler would be designated as A1A-A1A.

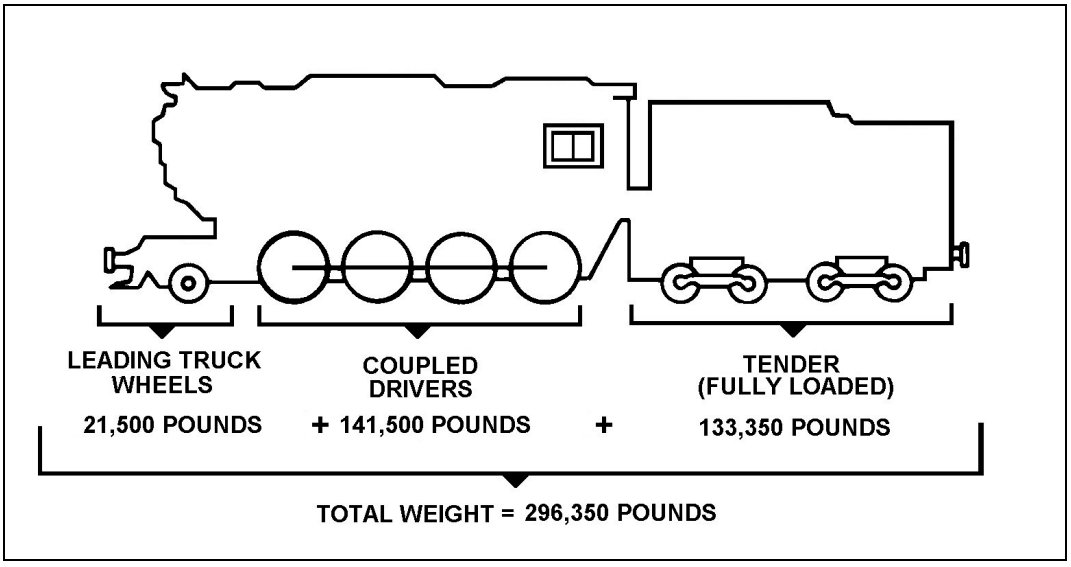


Figure 8-3. Weight Distribution of a 2-8-0 Steam Locomotive

TYPES OF RAILWAY EQUIPMENT

8-11. The three basic types of railway equipment are passenger, freight, and special. Each type of equipment is discussed below.

PASSENGER EQUIPMENT

8-12. Passenger equipment is used to transport personnel. There are several different types of passenger cars, each designed for a special purpose. Examples are coach cars, sleeper cars, baggage cars, and dining cars. Passenger cars can be modified to handle medical patients and are moved in designated ambulance trains.

FREIGHT EQUIPMENT

8-13. Use freight equipment primarily for the movement of general cargo. The commodity to be moved dictates the type of freight car that will be used. Table 8-12, page 8-14, lists examples of the most common freight equipment. Freight equipment, both domestic and foreign, is shown in Figure 8-4 and Figure 8-5, page 8-15. Table 8-13, page 8-16, lists freight equipment (by category) used in Europe by US forces.

SPECIAL EQUIPMENT

8-14. Special equipment consists of locomotives, wreck cranes, and snowplows. Figure 8-6, page 8-16, shows the special equipment used in domestic and foreign service.

CAR COMPONENTS

8-15. Transporters must have a basic knowledge of car components. Those in rail operations must have a thorough knowledge of car components. The four main components of a freight car are the deck, underframe, truck, and coupler.

DECK

8-16. The deck is the surface on which the load rests. The deck or floor is usually steel or wood.

UNDERFRAME

8-17. The underframe is the structure under the deck that supports the weight of the load. Figure 8-7, page 8-17, shows the topside and underside views of the underframe.

TRUCK

8-18. The truck is that assembly which contains a car's wheels, axles, journals, suspension system, and brake system. Figure 8-8, page 8-17, shows all the components of the truck.

COUPLER

8-19. The coupler is a device which connects or couples a car with another car (Figure 8-9, page 8-18). An automatic or knuckle coupler is used in CONUS and in military railroading. The hook-and-link system is used in Europe. The automatic coupler has two advantages over the hook-and-link system. The automatic coupler is stronger (allowing for heavier trains) and it is also safer. The automatic coupler does not require a trainman to step between the cars to couple them, but a hook-and-link coupler does.

Table 8-12. Examples of Railway Equipment

TYPE	COMMODITY	EXAMPLES
Boxcar	Bulk items that need protection from the weather and/or theft.	Paper, electronic gear, medical equipment.
Flatcar	Bulk items where protection from the environment is not a factor. Also items that will not fit in other freight cars.	Vehicles, CONEXs, containers, oversize loads.
Gondola car	Bulk items where protection from the environment is not a factor. The sides of the car help keep the load from shifting.	CONEXs, field barrier materials, steel, scrap metal.
Hopper car (covered hopper)	Free-flowing solids that need protection from the environment.	Gravel, coal, sand, grain, chemicals.
Tank car	Bulk liquids.	POL, chemicals, water, beer.
Refrigerator car	Items that need a constant temperature--either cool in a warm environment or warm in a cold environment.	Perishables, whole blood, electronic equipment.

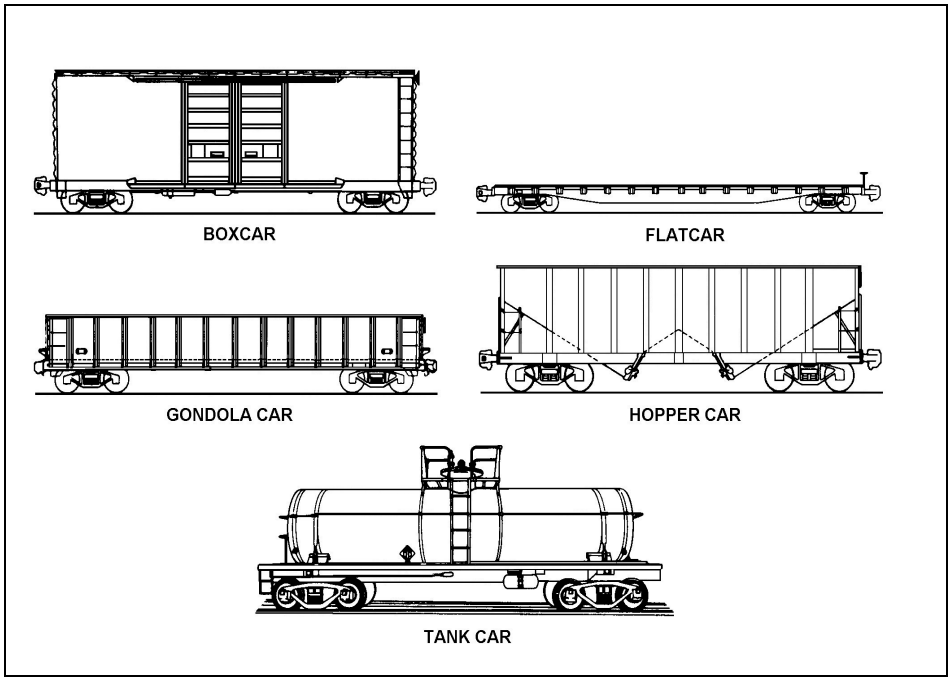


Figure 8-4. Freight Equipment (Domestic)

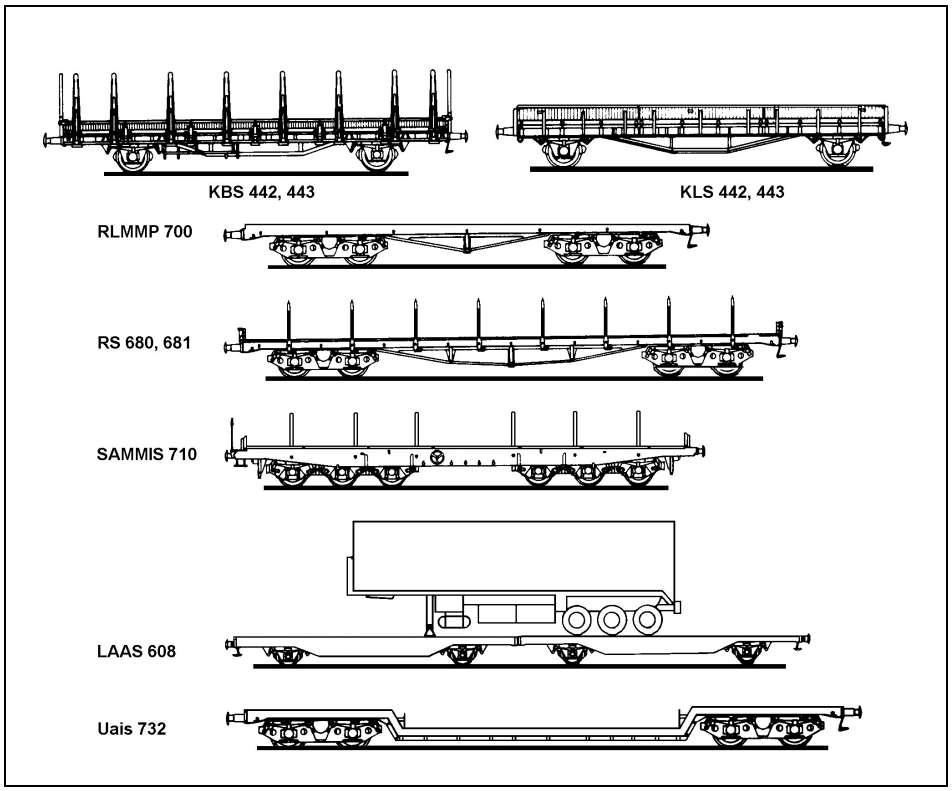


Figure 8-5. Freight Equipment (Foreign Service)

Table 8-13. Examples of Foreign Flatcars

Type	Number of Axles	Maximum Loading Specifications			Remarks
		Length (m)	Width (m)	Weight (m)	
Light-duty flatcars:					
KBS 442, 443	2	12.50	2.77	27	With stakes, removable side and end walls.
KLS 442, 443	2	12.50	2.77	27	With removable side and end walls.
Heavy-duty flatcars:					
RLMMP700	4	9.50	3.15	52	
RS 680	4	18.50	2.74	56	
RS 681	4	18.50	2.78	56	
SAMMS 710	6	15.00	3.11	65	End jacks provide stability during loading and off-loading.
Special flatcars:					
LAAS 608	4	9.00 per section	2.50	54	A short-coupled unit comprised of two 2-axle flatcar sections.
Uais 732	4	10.00	2.50	50	Deep-well cars are available in various sizes but are few in number and are in high demand.

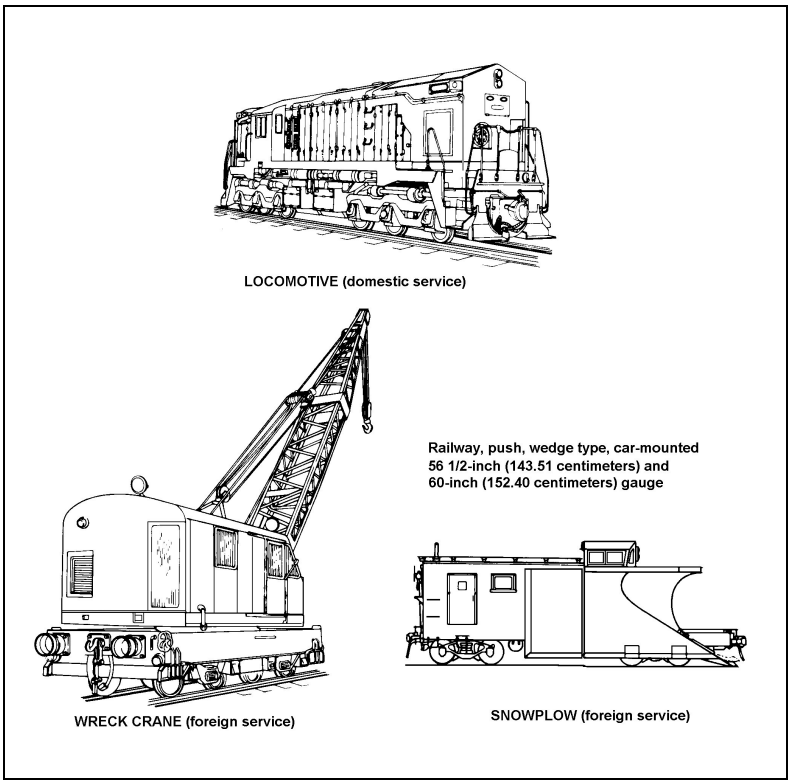


Figure 8-6. Special Equipment (Domestic and Foreign Service)

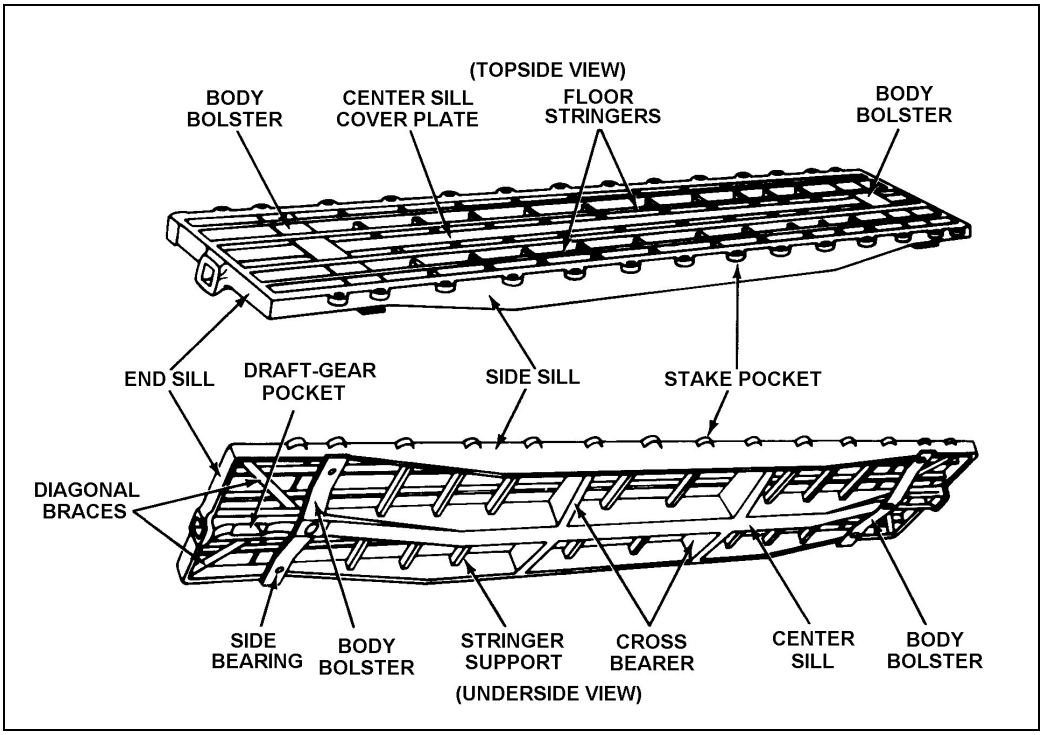


Figure 8-7. Underframe

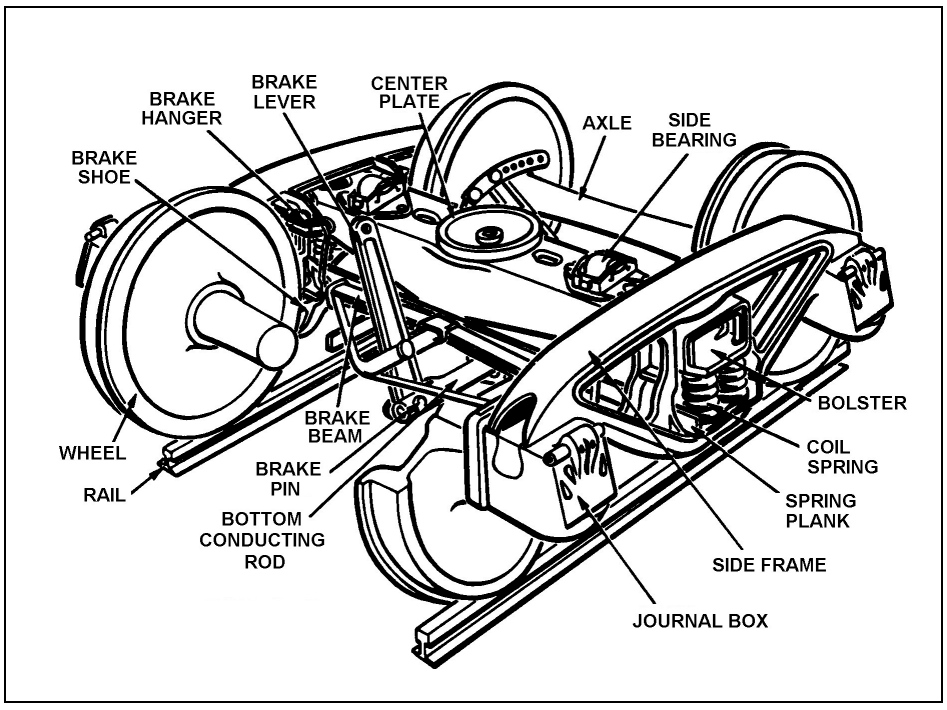


Figure 8-8. Truck

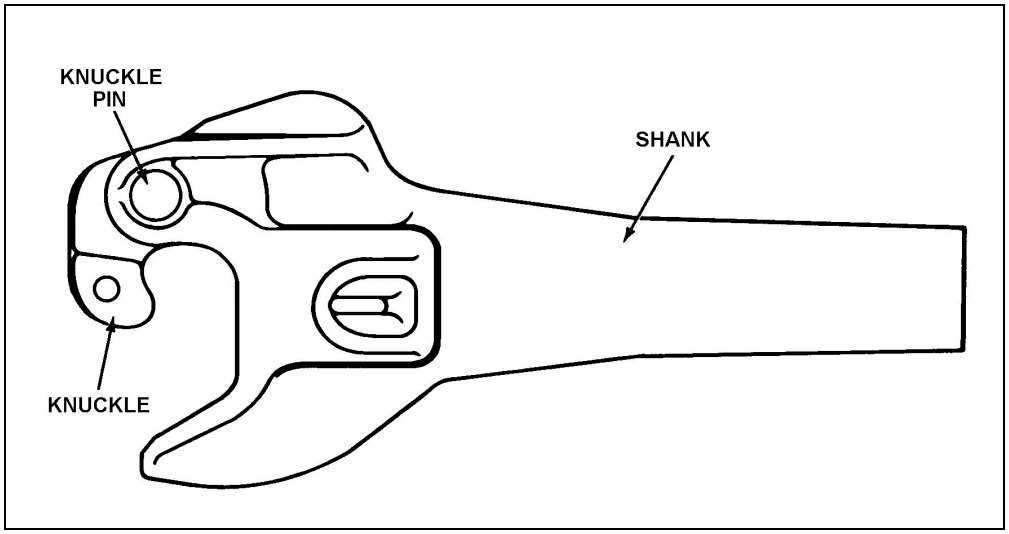


Figure 8-9. Automatic Coupler

EFFECTS OF COLD WEATHER ON MOTIVE POWER AND ROLLING STOCK

8-20. In the past, steam locomotives were used successfully by all railroads operating in cold climates. Most of the world's railroads have adopted the diesel because it offers certain advantages over the steamers. However, there are certain modifications that must be made to both types of locomotives before they are entirely suitable for extremely cold weather operations.

STEAM LOCOMOTIVES

8-21. Efficient steam locomotive operation depends on a local supply of fuel, water, and sanding facilities at suitable points along the line. Coal platforms are constructed with their beds level with the top of tenders. Such platforms have been used without any great difficulty resulting from cold temperatures. Water tanks must be kept heated all winter. This is done with steam pipes, which encircle the interior of the tank. In any climate having winter temperatures as low as 40 degrees Fahrenheit, sand for wheels must be thoroughly dried.

Insulation

8-22. Personnel will insulate exposed water pipes to keep them from freezing and exposed steam pipes to prevent heat loss. Locomotive cabs are especially insulated. On steam heated passenger cars, cover windows at night with blankets to keep out the extreme cold.

Standby Service

8-23. When steam locomotives are used, engine watchers must be provided. The watchers must fire up the engines to keep up pressure and must put water in the boilers. When first moving a steam locomotive, the cylinder cocks must always be opened to relieve the cylinders of extremely heavy condensation. In average winter climates, one watcher may tend as many as ten locomotives. In cold climates, the number of locomotives for each man must be reduced because of the greater variety of duties. These duties consist of continual operation and/or checking of the following:

- Stokers.
- Boiler blowoffs.
- Injectors.
- Cylinder cocks.
- Lubricators.

Reverse levers (particularly screw-reverse types) have to be operated frequently to protect against freezing. Any water leaking on parts that move must be corrected at once to prevent ice from forming. Placing locomotives inside heated roundhouses or enginehouses will substantially reduce standby service.

DIESEL LOCOMOTIVES

8-24. Diesel locomotives require considerably less standby service than steam locomotives. In extremely cold climates, the problem of water supply is virtually eliminated. However, before using diesels in subzero temperatures, make the following modifications.

- Insulate all outside piping to protect against freezing.
- Preheat fuel because of the extreme difference between the unheated fuel and the flashpoint. Install heaters in engine compartments.
- Keep engine coolant warm to aid in starting the locomotive under extreme conditions.
- Under extreme conditions, locomotives must not be shut down unless engine block heaters are used.
- Keep storage batteries reasonably warm to secure maximum output. Place coils of pipe around the battery boxes through which the saline water flows.
- Small steam generators must be provided to heat the cab and passenger coaches. Install extra insulation in engine cabs.
- Windows of cabs and passenger coaches should have sealed, airtight, double-thickness glass to keep out the cold.

ROLLING STOCK

8-25. One of the greatest problems encountered with cars is the freezing of journal boxes. When cars stand for any length of time, the journal boxes freeze so tightly that the wheels slide instead of turning when an attempt is made to move them. Sometimes a train of 20 cars that has been stationary for even a few hours will have to be broken into three or four sections and each section started individually. After moving the cars a short distance, the heat generated by the axle action on the bearing will warm and thaw the journal box. This condition will naturally delay operations and can only be overcome by moving cars and trains as much as possible. Cars equipped with roller bearings are less of a problem. Extreme cold can cause steel car parts to become so brittle that they break easily. As a result, knuckles may be broken when cars strike each other and drawbars pulled when "frozen" trains are started. When possible, cars should be switched as soon as they come into a yard and while the journal boxes are relatively warm. Trains on main tracks or in sidings should not be permitted to remain stationary longer than absolutely necessary.